Monte Carlo Estimation of Accuracy Gains from Option and Pair Elimination in Matching Tasks

# Abstract

Matching word problems are common in tests and many test taking strategies have been developed, both explicitly and implicitly, to improve chances of correctly answering them. Unlike other variations of multiple-choice questions, matching word questions are rather difficult to guess correctly. Matching word problems usually consist of multiple terms on the left, and multiple definitions or answer on the right, usually unordered. The test-taker’s goal is to match them one-to-one correctly.

In this exploration, we seek to measure the gains in accuracy from two common strategies in matching word problems: eliminating possible matches for a given term and specific pairings. Both are separated simulated based on the additional premise that the removal is always of an incorrect term or pairing, as test-takers sometimes eliminate the correct option.

A paper with text on it

AI-generated content may be incorrect.

# Introduction

A match word problem will always have the same amount of choices on the left and right. Thus, the total possible amount of permutations is given as:

For number of options.

Expectation of number of correct answers (matches) for this type of problem is always 1, since the probability of selecting a correct answer decreases as the number of options increases (so does the amount of chances to select a correct answer, however):

This was reduced to 1 via linearity of expectation.

We can split our analysis up into two portions: that in which correct answers will never be eliminated, and that in which correct answers may be eliminated.

## Correct Answers May Be Eliminated

If correct answers can be eliminated, the earlier formula remains true at large. However, to calculate the probability we need to use the inclusion-exclusion rule.

For example, a set of three is given as:

## Correct Answers May Not Be Eliminated

# Methods

We represented the problem as a matrix, with terms as rows and answers as columns. All values were set by default to true, with eliminated options/pairs being set to false. Options were eliminated as “k options eliminated per term” for every time, while pairs were eliminated as “y pairs per entire problem.” Such that nature is that for , more pairs are eliminated for former, but the latter sees eliminations unevenly scattered through rows.

Any comparison between the two methods must take place with the same on the x-axis, but on the y-axis.

The difference between eliminating pairs compared to eliminating values lies in a that

Improvement was used as a metric to judge the effectiveness of both removing options and pairs from pairs, given by the formula:

# Results

# Figures

A graph showing the effect of a pair of air

AI-generated content may be incorrect.A graph showing the effect of a word

AI-generated content may be incorrect.A graph of different colored lines

AI-generated content may be incorrect.A graph showing the effect of incorrect per-word

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